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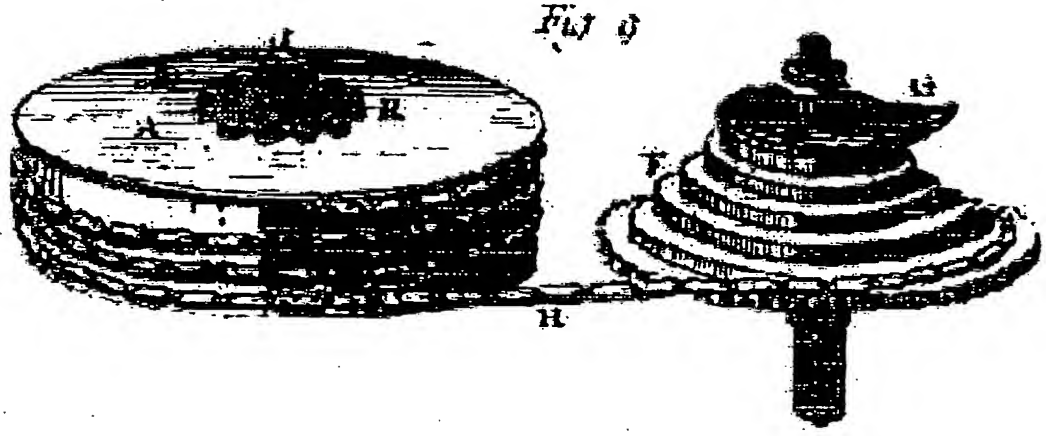


Chain and fusee
From "Diderot et d'Alembert", 1751 -1772, Horlogerie, page CC.

Figure 1a

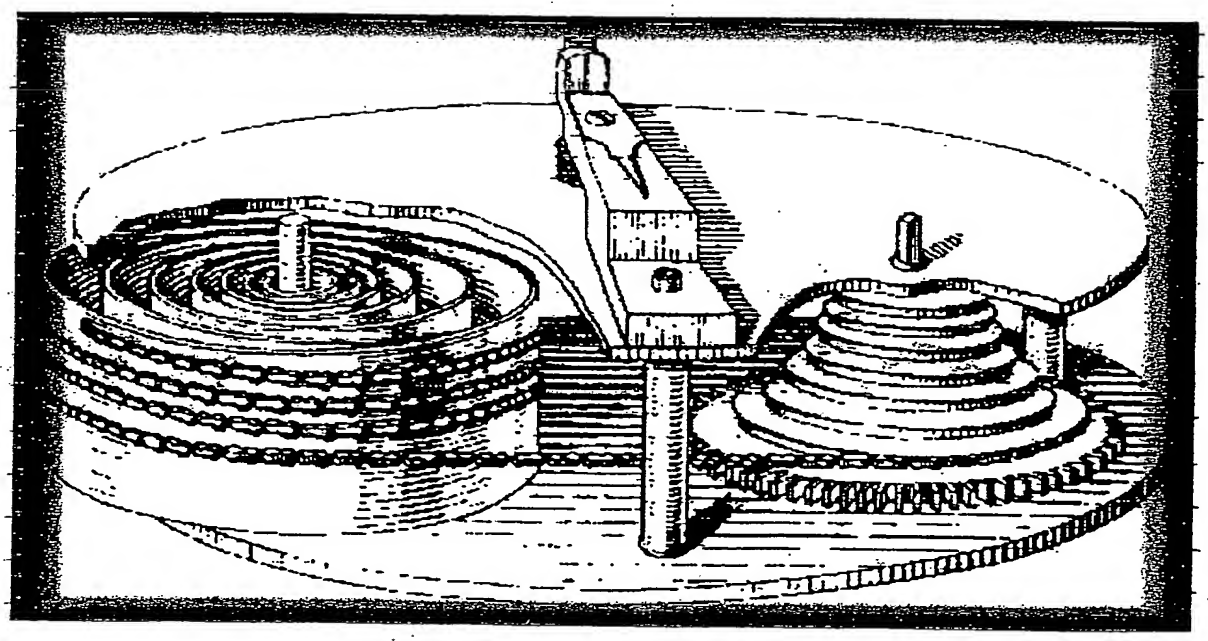


Figure 1b

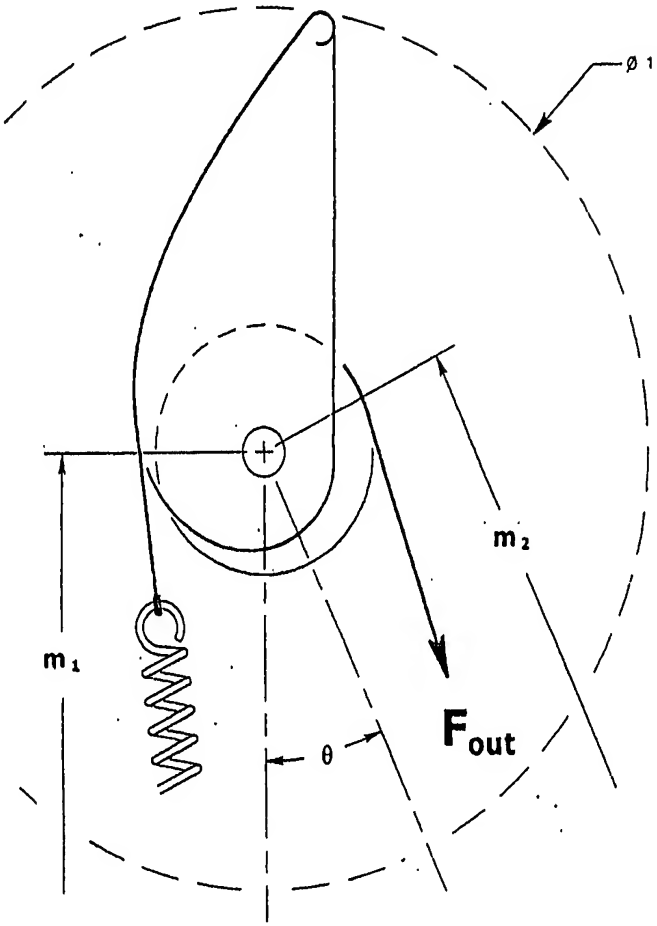


Figure 2a

Constant Force Mechanism
Constant Torque Profile

$L_1 = L_2$

λ_{max} = 230 degree

PRIOR ART

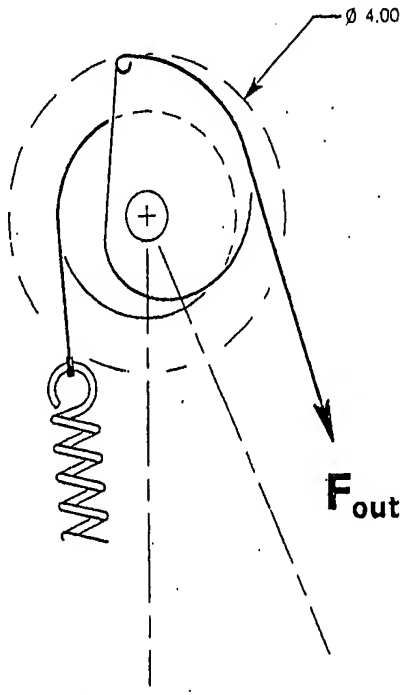


Figure 2b

Constant Force Mechanism
Linear Torque Profile

$L_1 = L_2$

λ_{max} = 280 degree

PRIOR ART

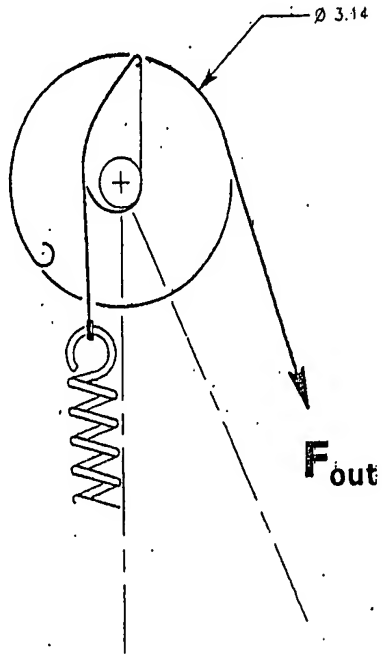


Figure 2c

Constant Force Mechanism
Constant Torque Profile

$L_1 \ll L_2$

λ_{max} = 230 degree

PRIOR ART

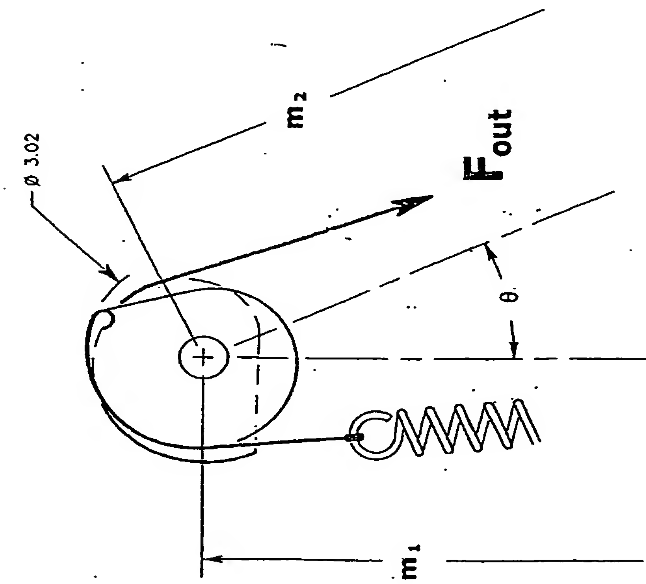


Figure 3a
Constant Force Mechanism
Parabolic Torque Profile
$L_1 = L_2$
λ_{max} = 290 degree

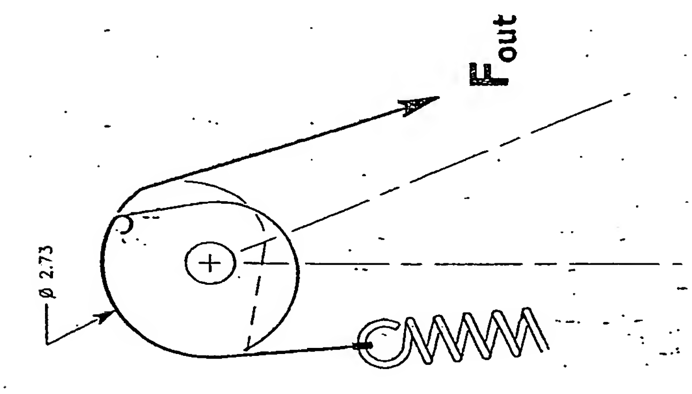


Figure 3b
Constant Force Mechanism
Composite Torque Profile
$L_1 = L_2$
λ_{max} = 300 degree

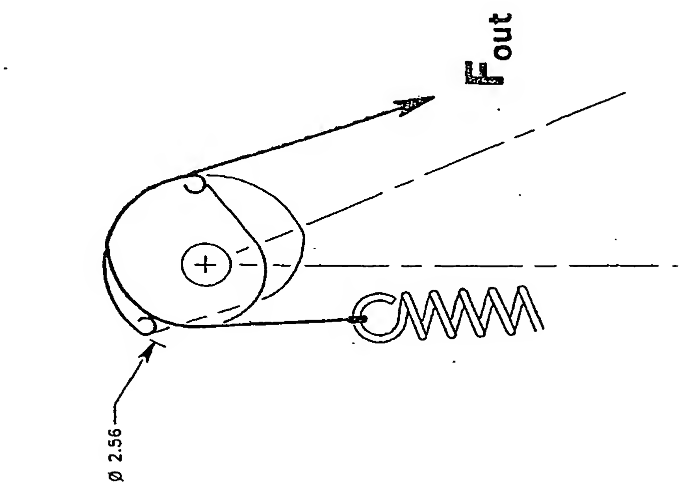


Figure 3c
Constant Force Mechanism
Composite Torque Profile
$L_1 < L_2$
λ_{max} = 300 degree

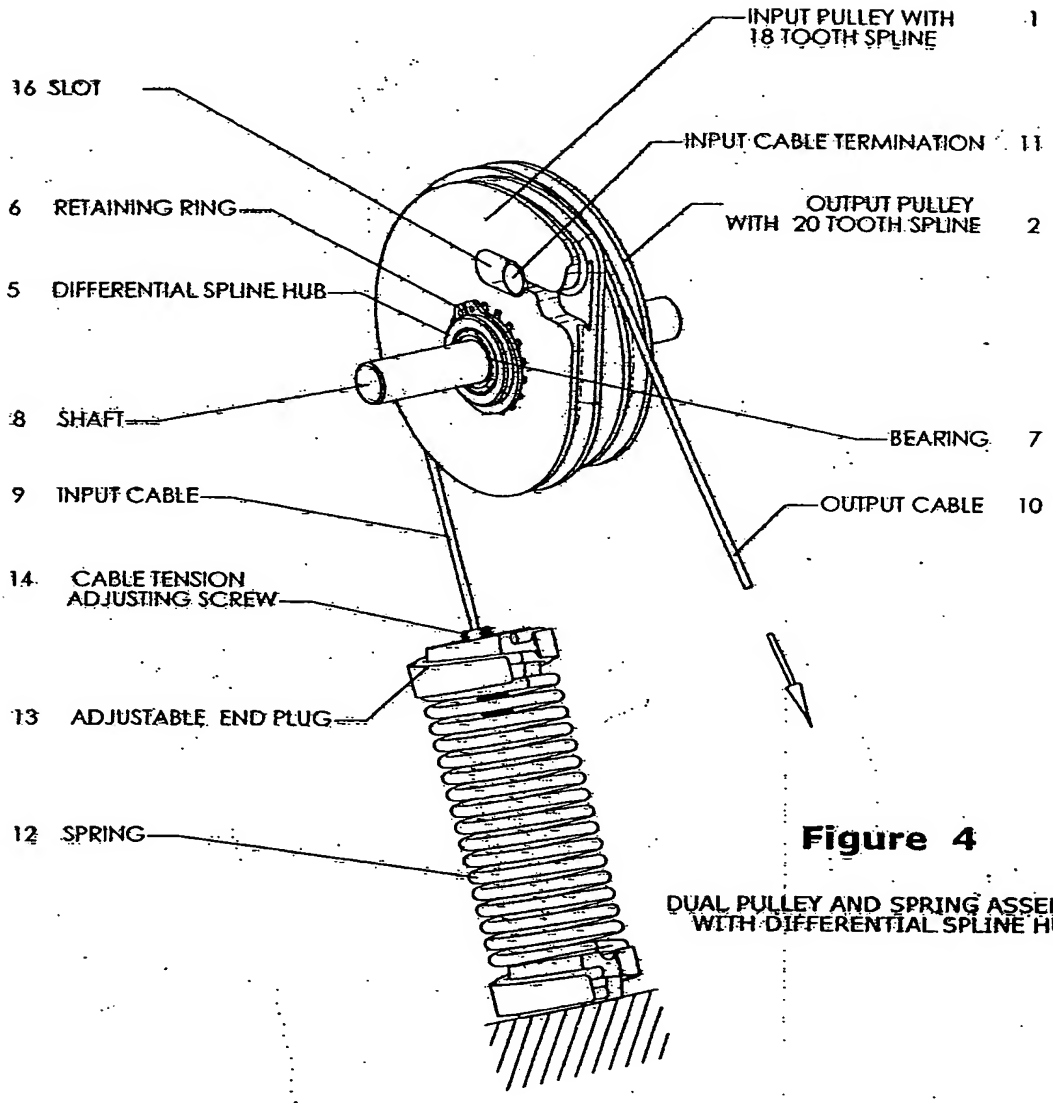


Figure 4

DUAL PULLEY AND SPRING ASSEMBLY WITH DIFFERENTIAL SPLINE HUB

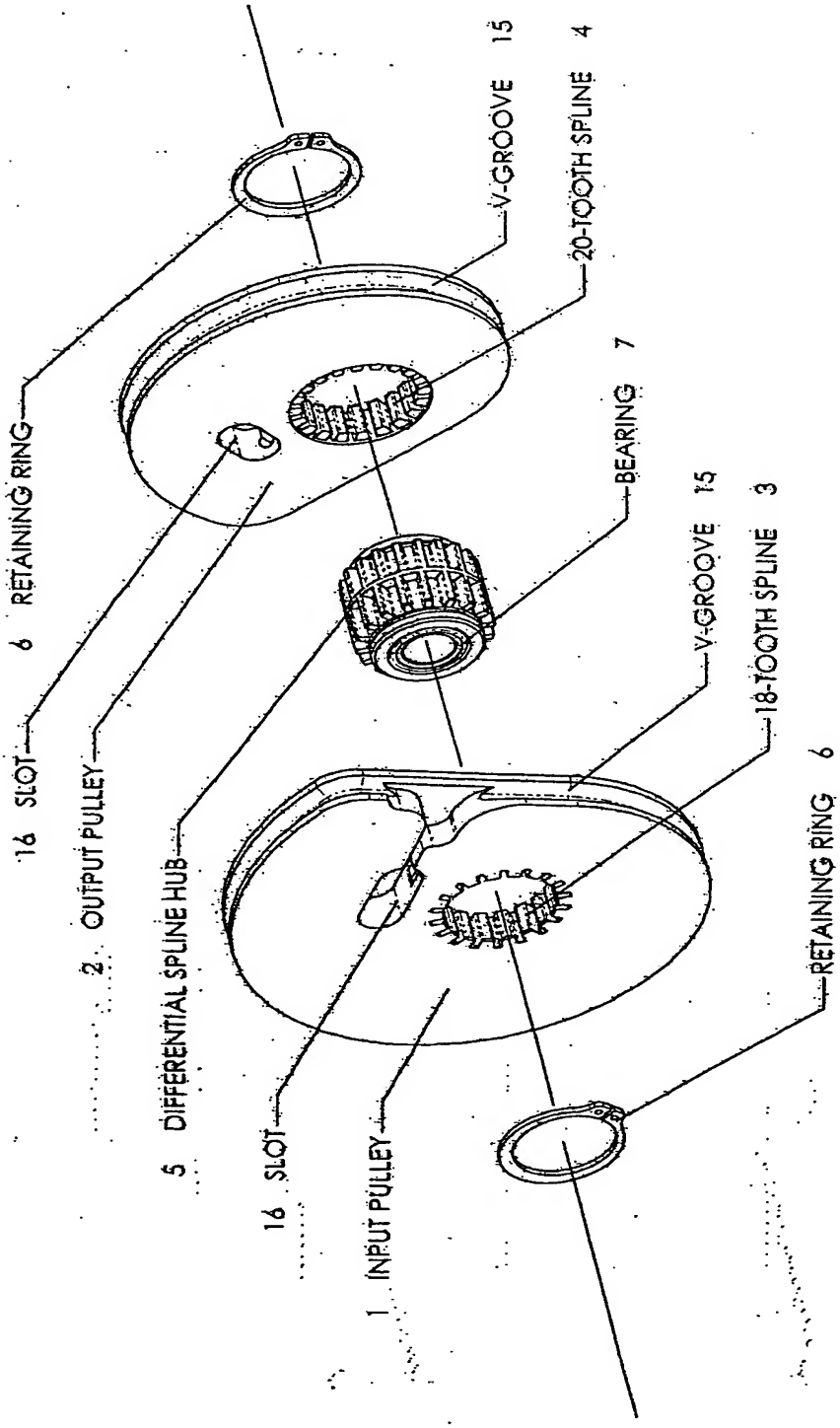


Figure 5

DUAL PULLEY ASSEMBLY
WITH DIFFERENTIAL SPLINE HUB

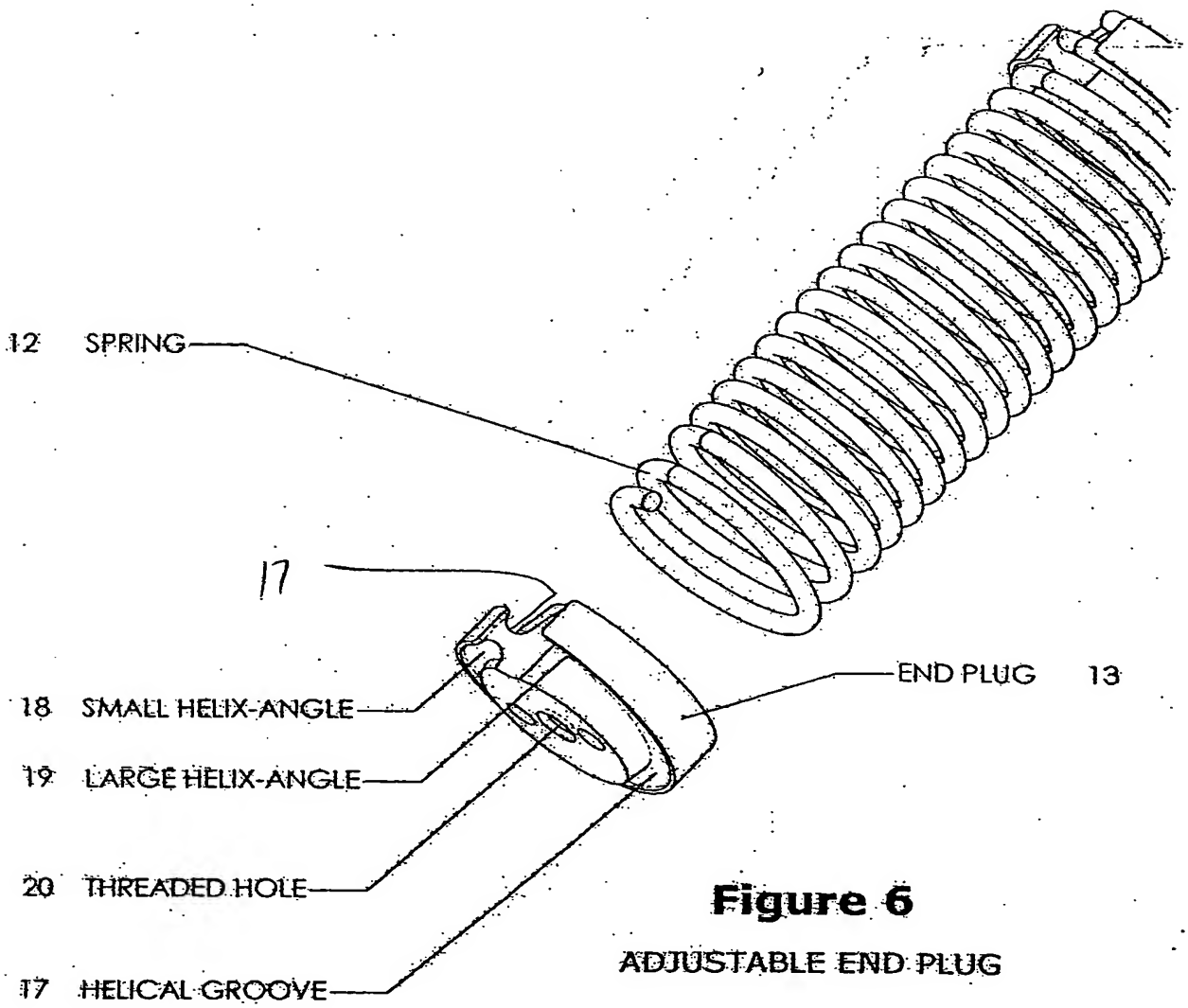


Figure 6

ADJUSTABLE END PLUG

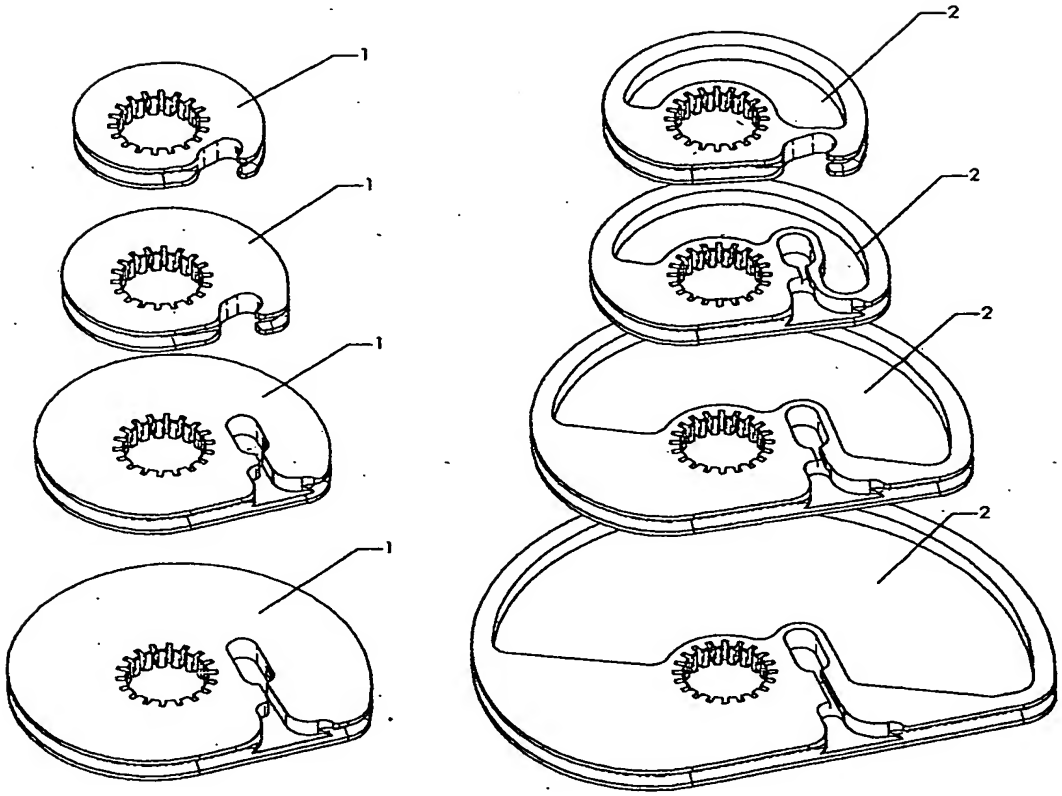


Figure 7

PULLEY ASSORTMENT

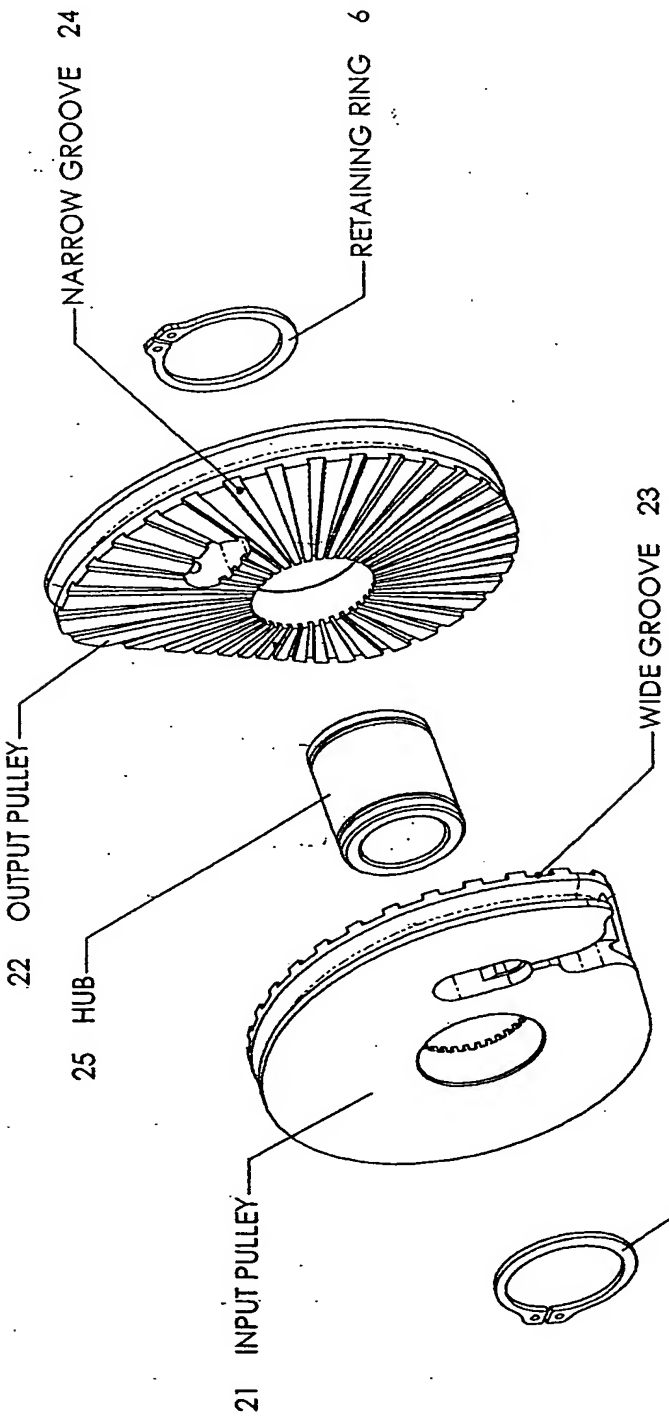


Figure 8

DUAL PULLEY ASSEMBLY
WITH RADIAL GROOVES

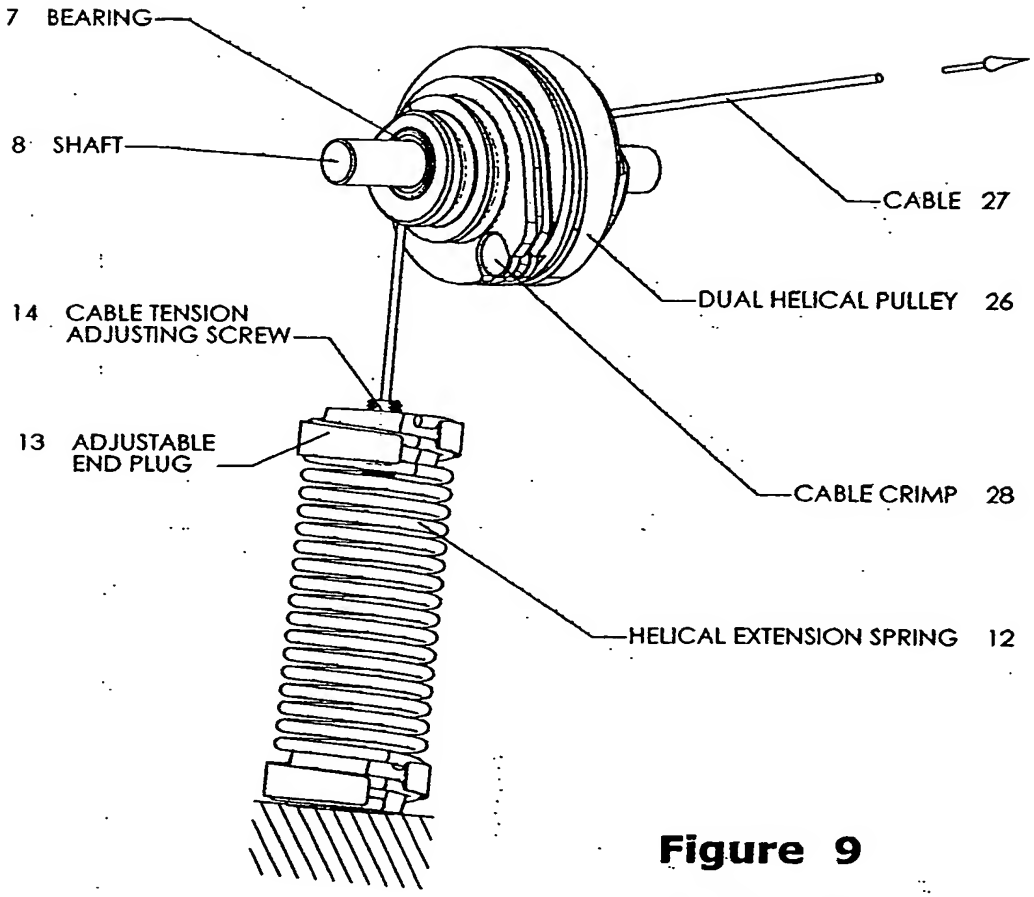


Figure 9

ADJUSTABLE SPRING AND DUAL HELICAL PULLEY

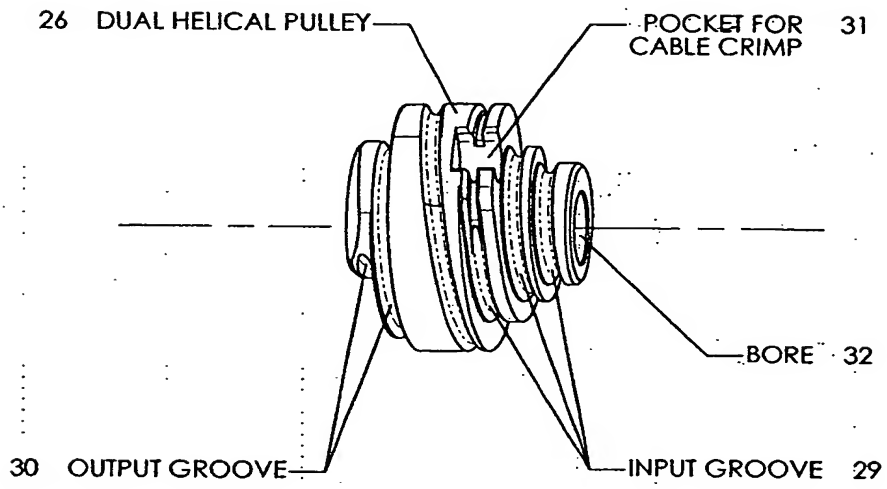


Figure 10

ONE-PIECE
DUAL HELICAL PULLEY

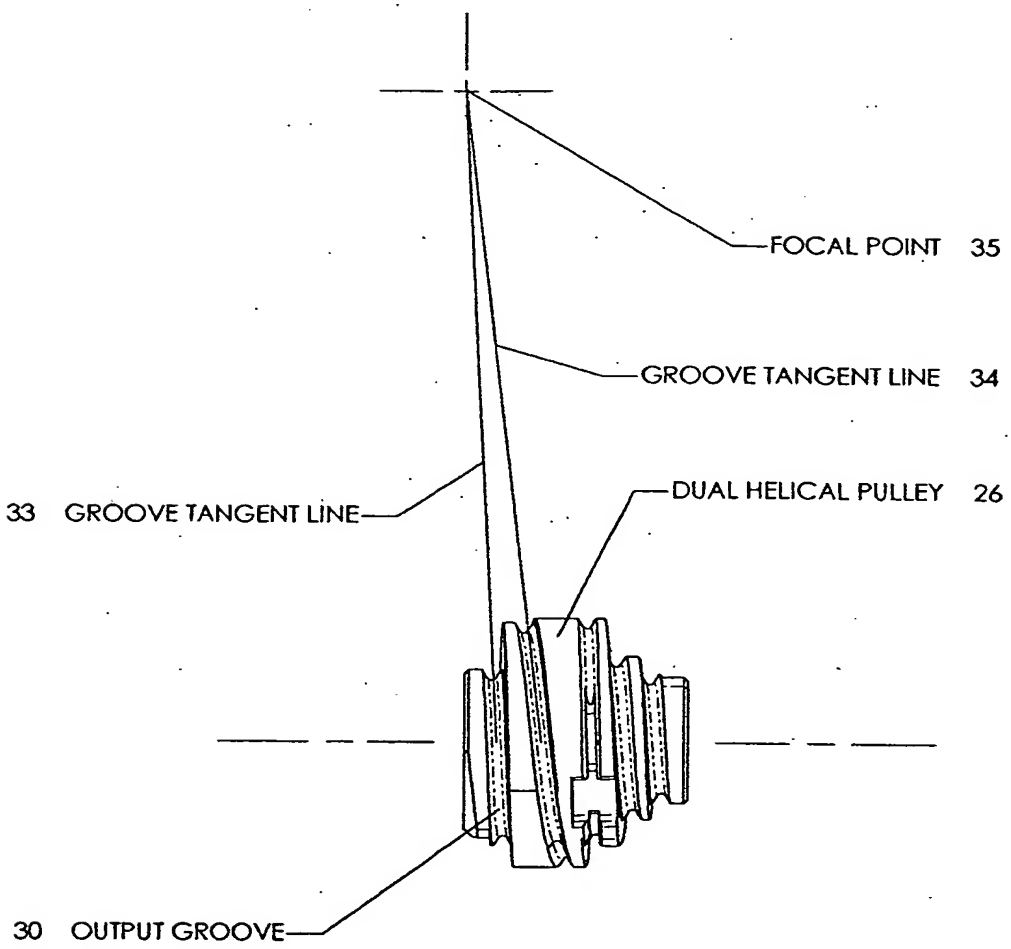


Figure 11

FOCUSED-GROOVE
DUAL HELICAL PULLEY

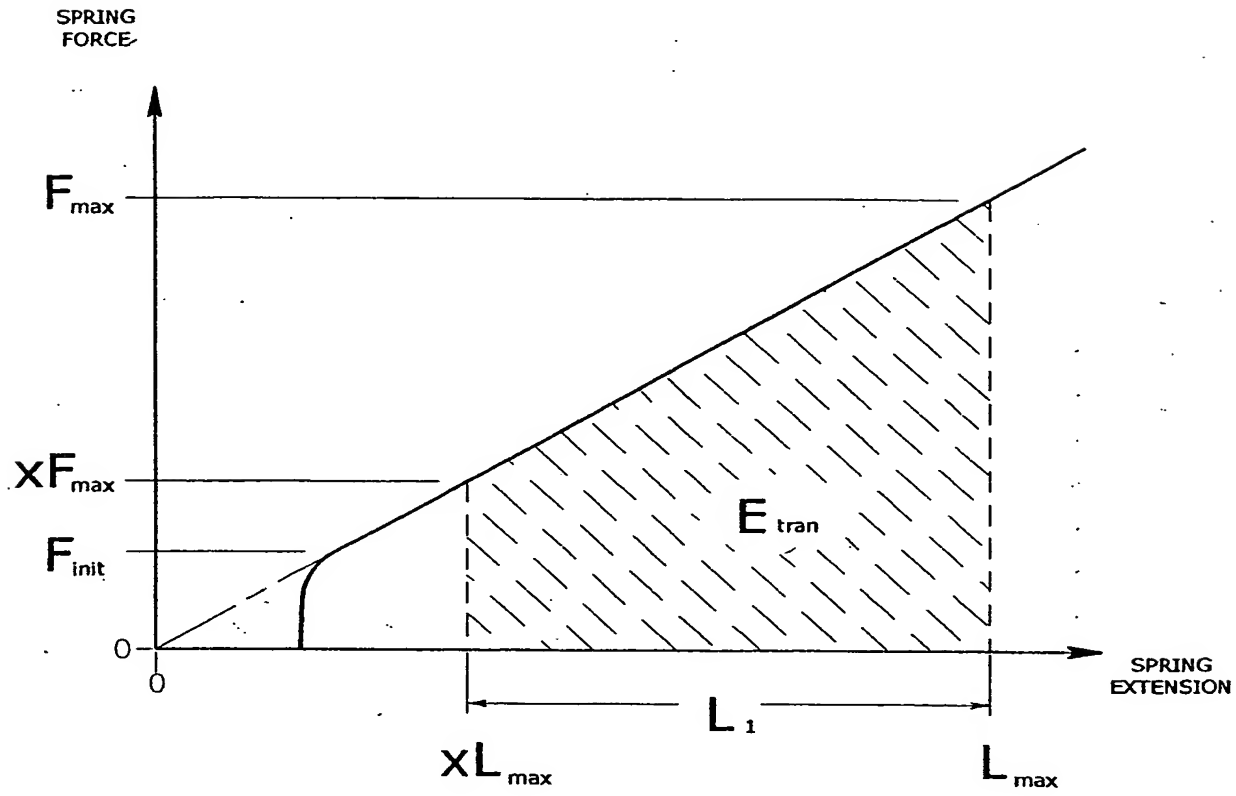


Figure 12

Helical Spring
Force Deflection Curve

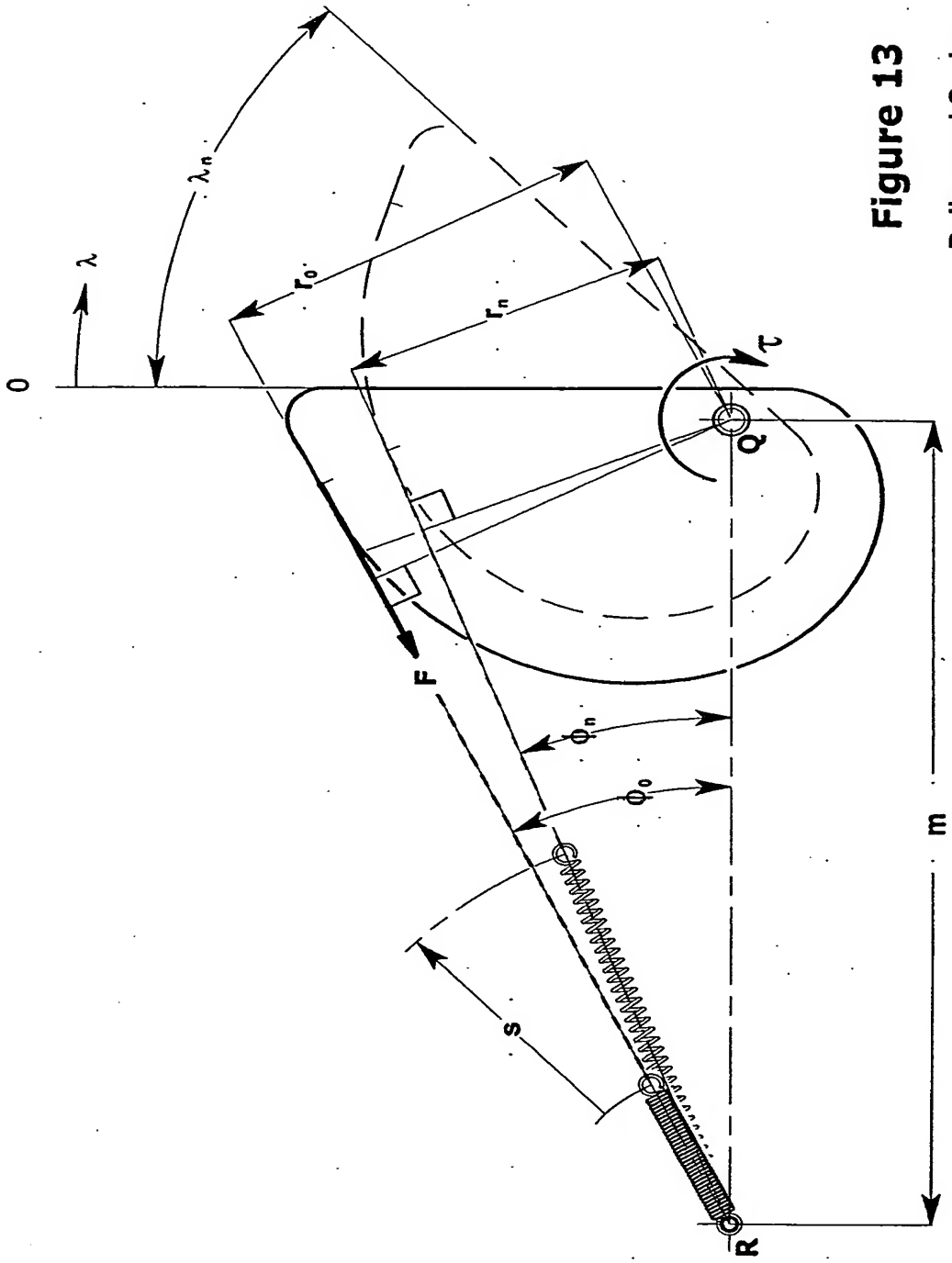


Figure 13

Pulley and Spring Free Body Diagram

Figure 14a
Single Stage Input Pulley
with a Constant Torque Profile
Radius vs. Pulley Angle

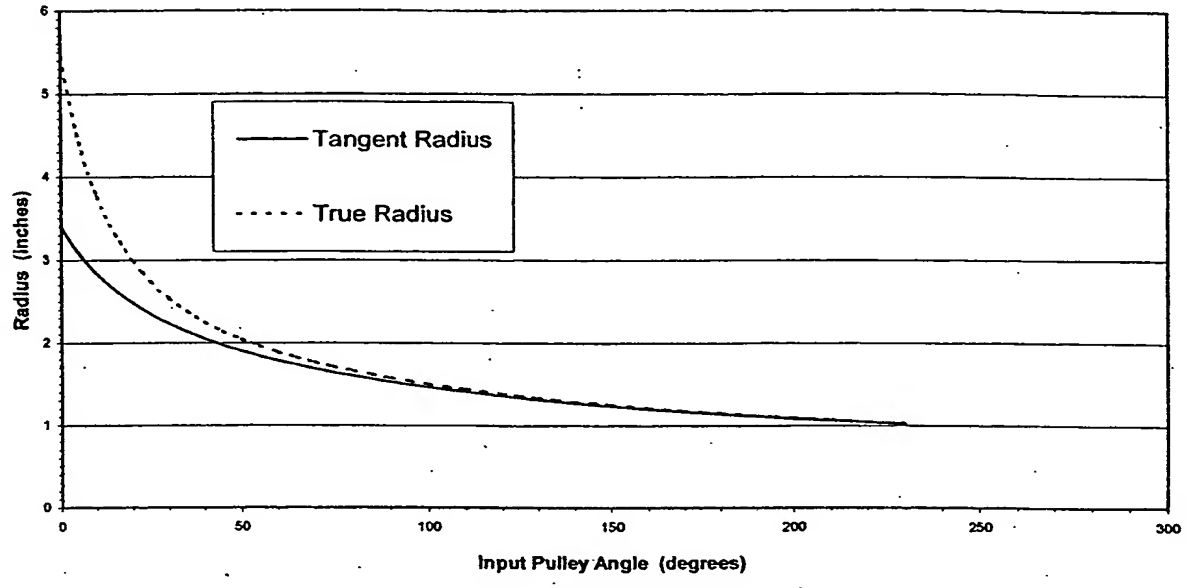


Figure 14b
Single Stage Output Pulley
with a Linear Torque Profile
Radius vs. Pulley Angle

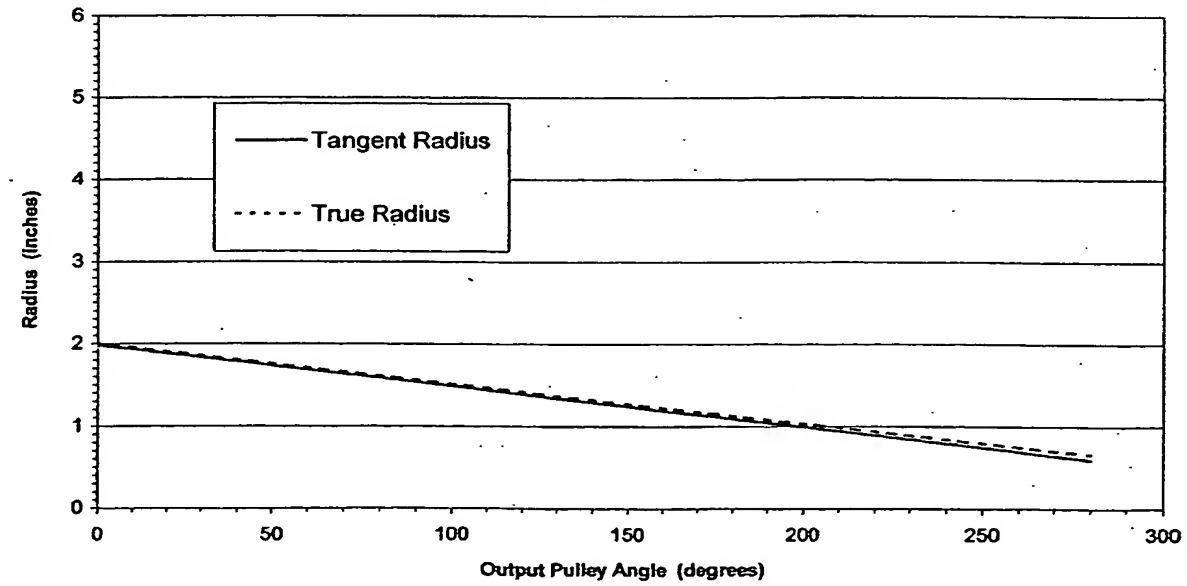


Figure 15a
Input Pulley
With a Composite Troque Profile
Radius vs. Pulley Angle

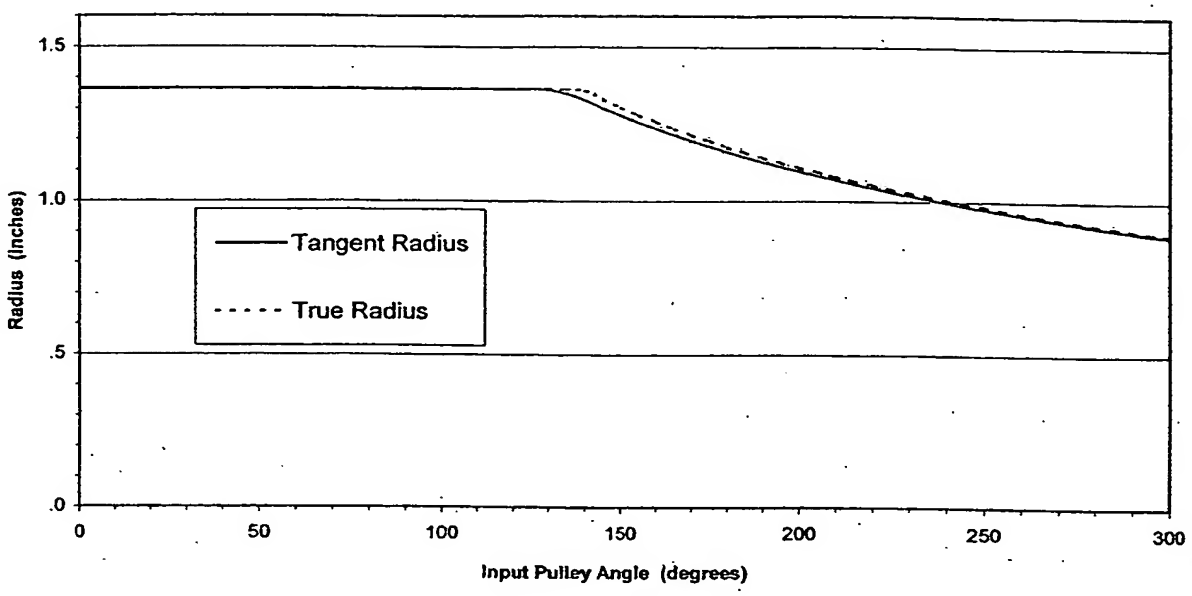


Figure 15b
Output Pulley
With a Composite Torque Profile
Radius vs. Pulley Angle

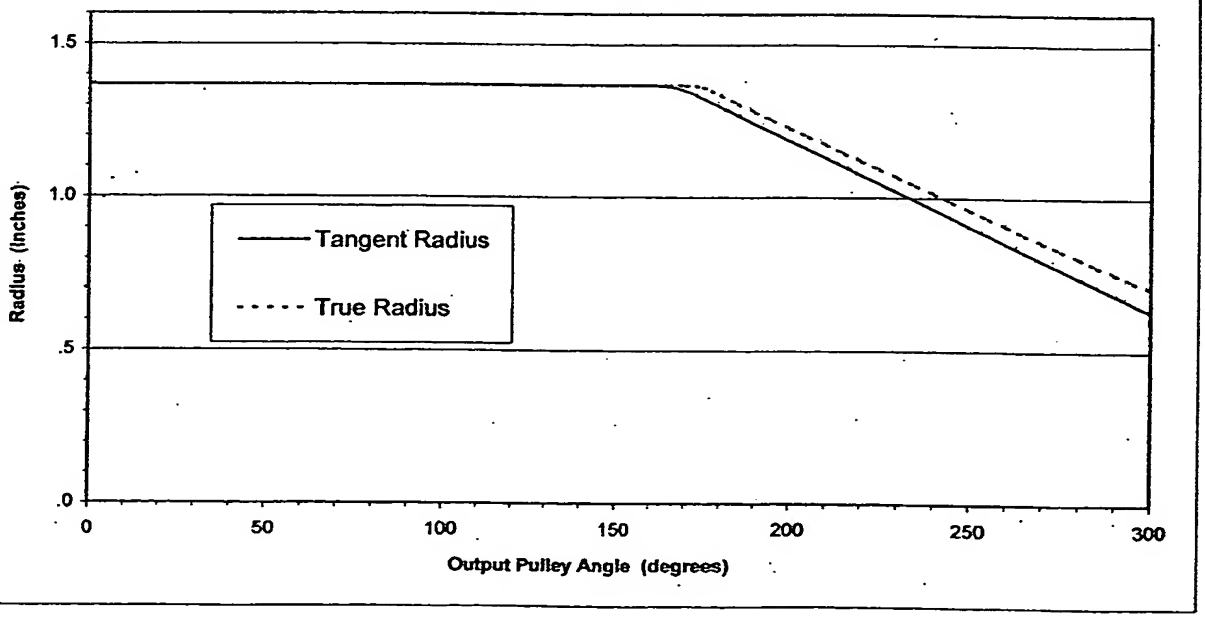


Figure 16a
Input Pulley
With a Parabolic Torque Profile
Radius vs. Pulley Angle

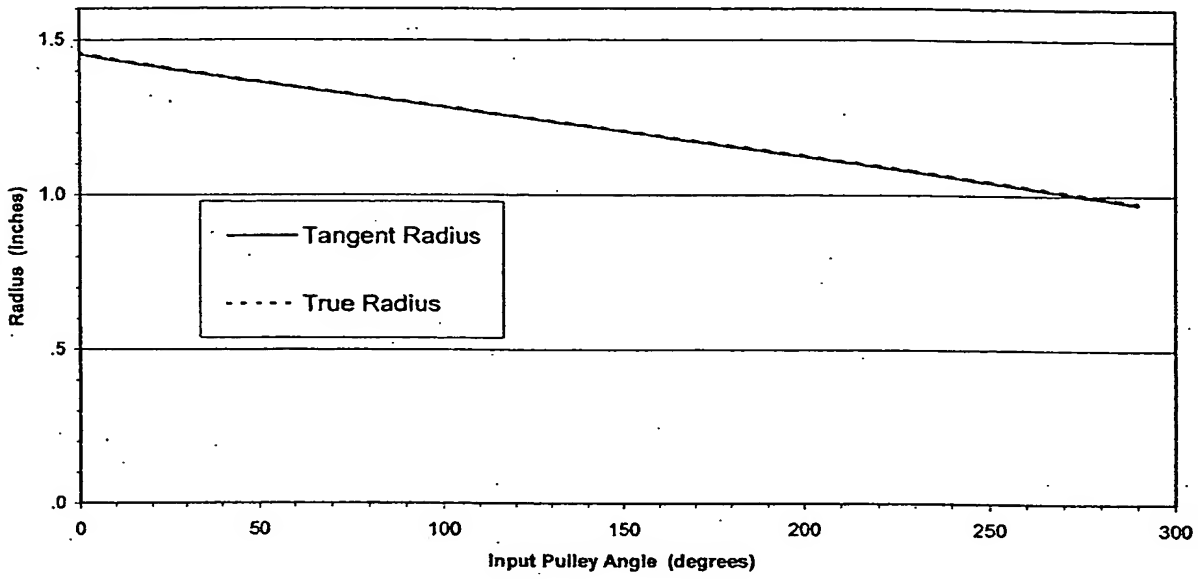
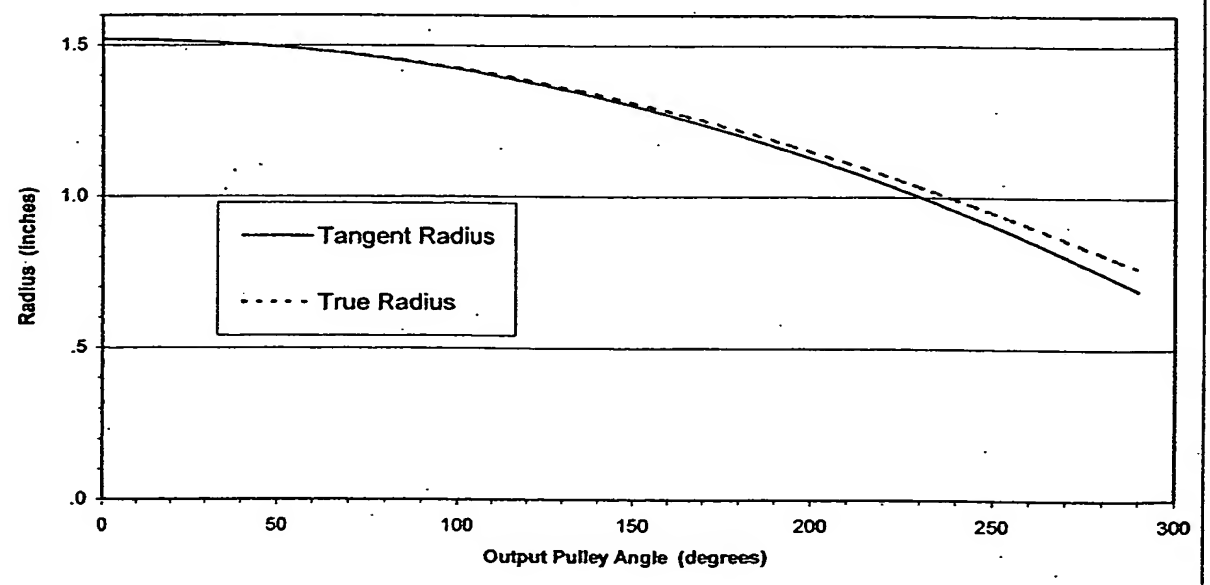


Figure 16b
Output Pulley
With a Parabolic Torque Profile
Radius vs. Pulley Angle



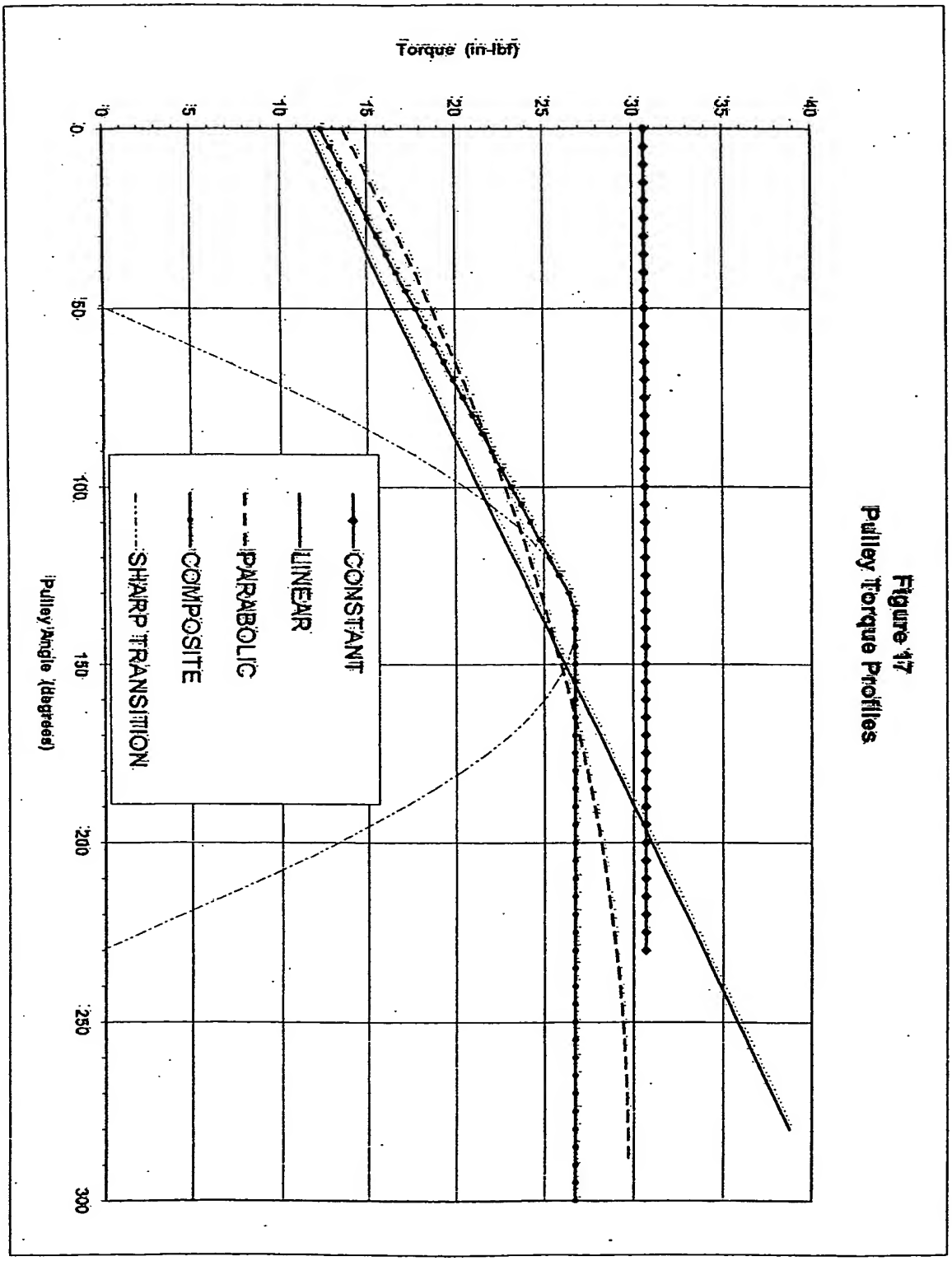


Figure 17
Pulley Torque Profiles

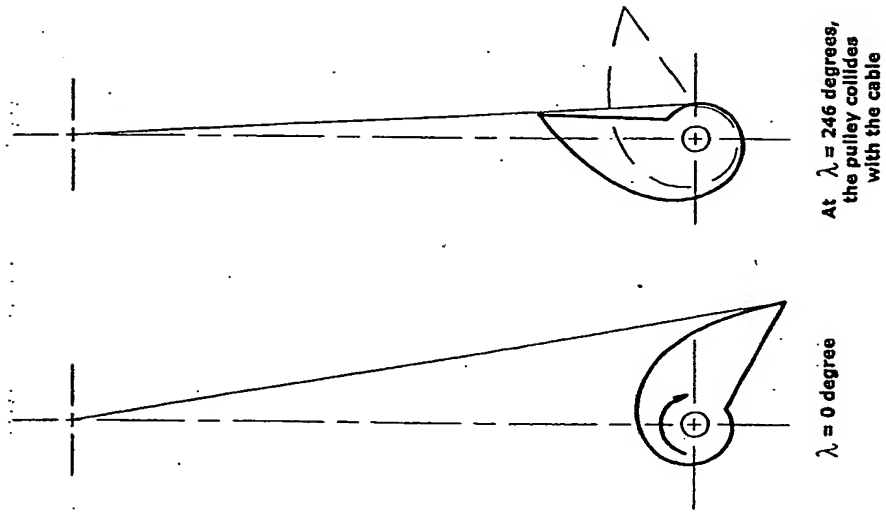


Figure 18b

Maximum Angle of Rotation

λ_{max} = 300 degree

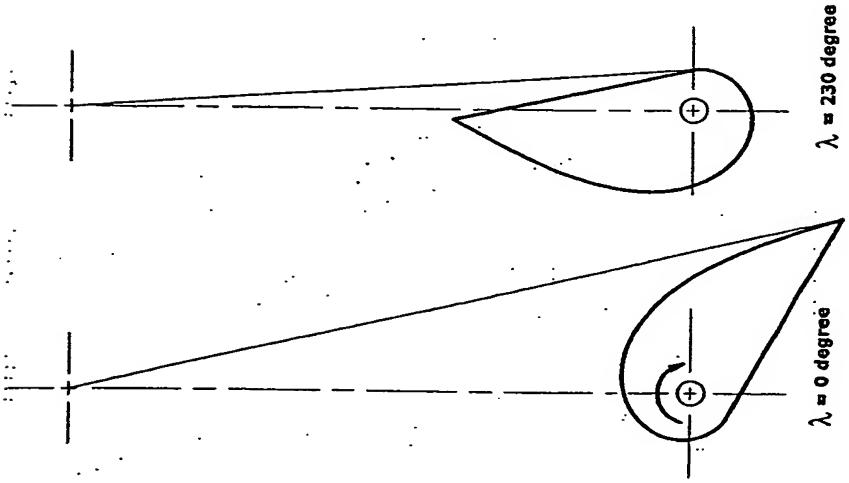


Figure 18a

Maximum Angle of Rotation

λ_{max} = 230 degree

Figure 19a
Input Pulley
Tangent Radius vs. Angle

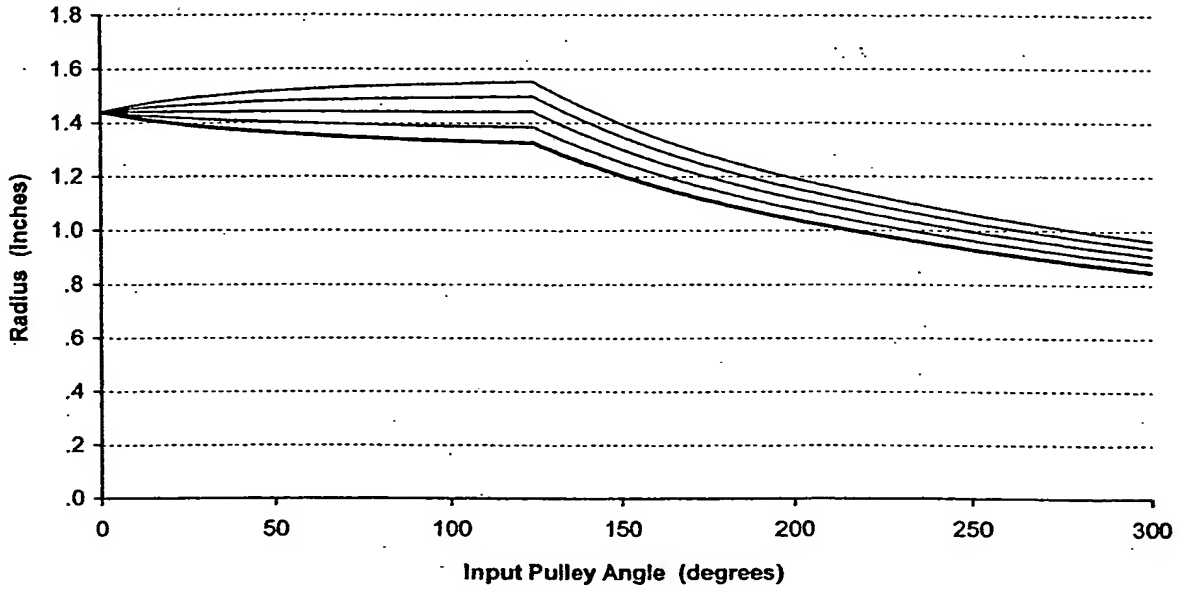


Figure 19b
Pulley Torque vs. Angle

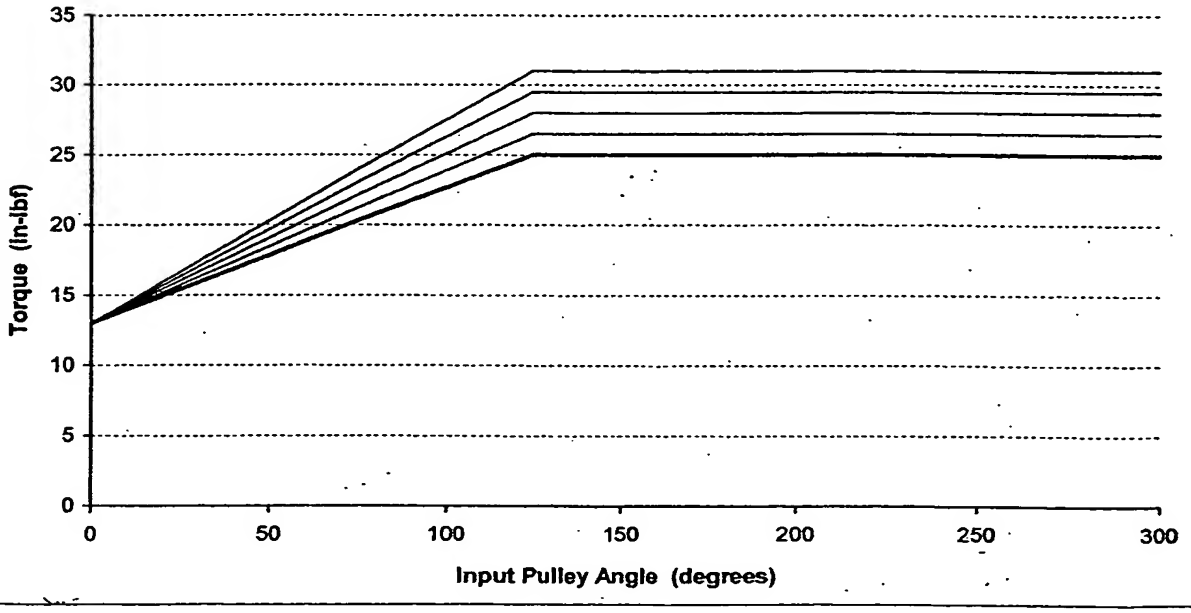


Figure 20a
Input Pulley
Tangent Radius vs. Angle

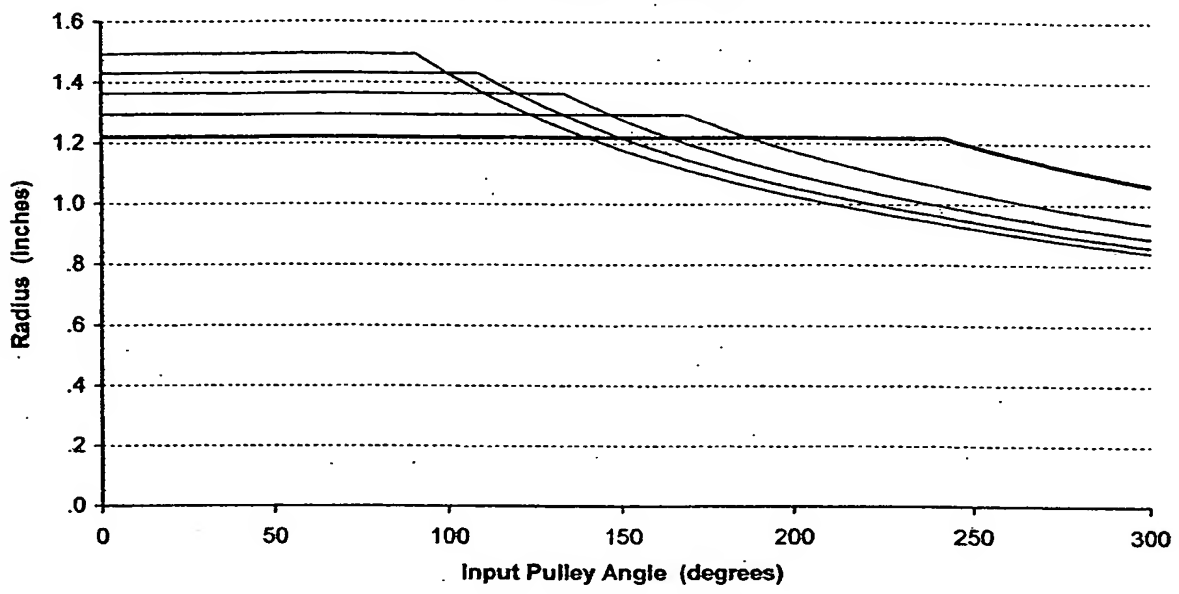


Figure 20b
Pulley Torque vs. Angle

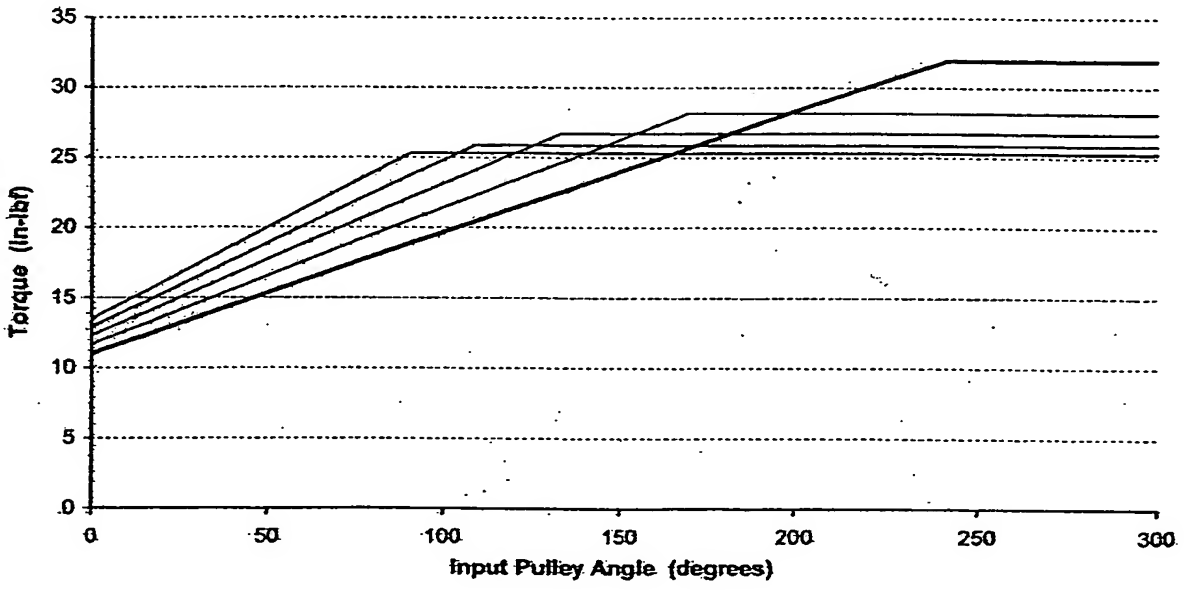


Figure 21a
Output Pulley
Tangent Radius vs. Angle

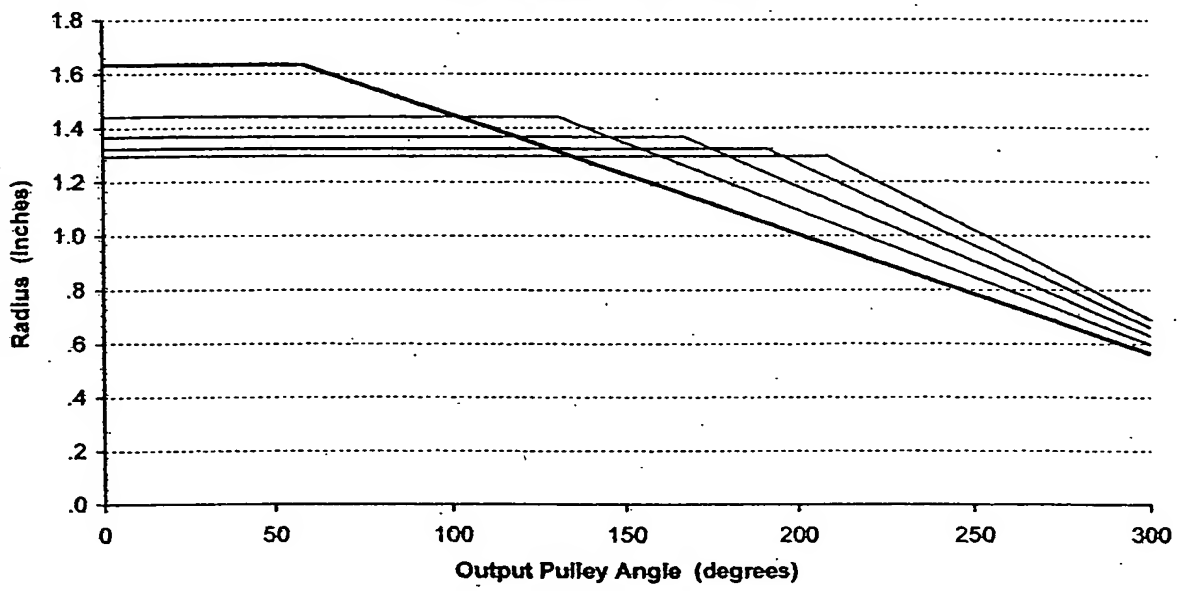
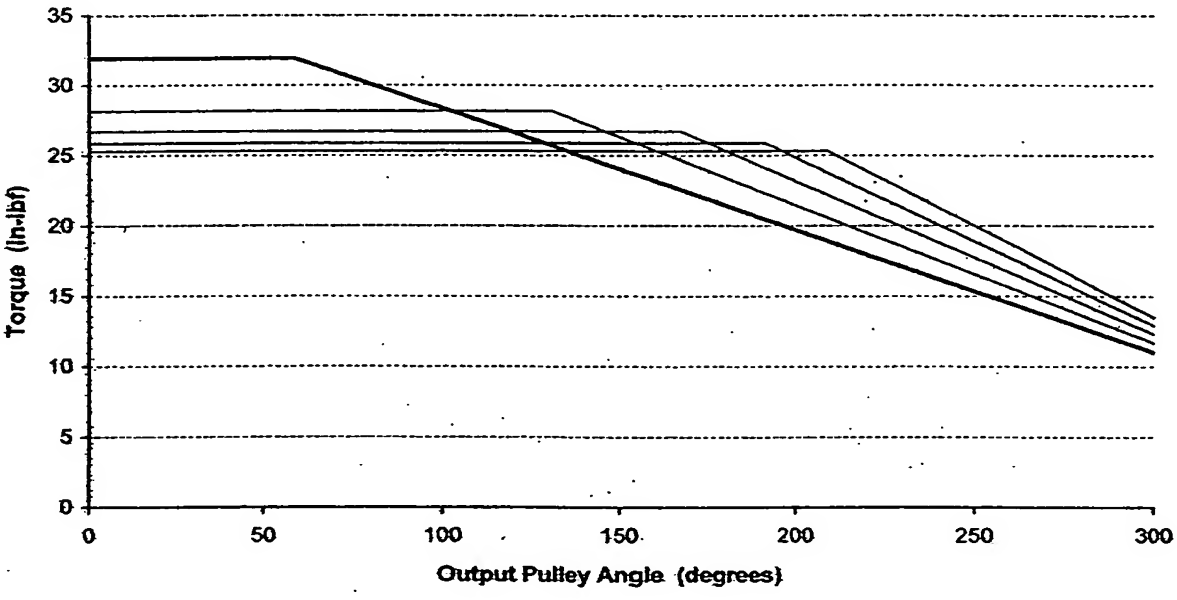


Figure 21b
Pulley Torque vs. Angle



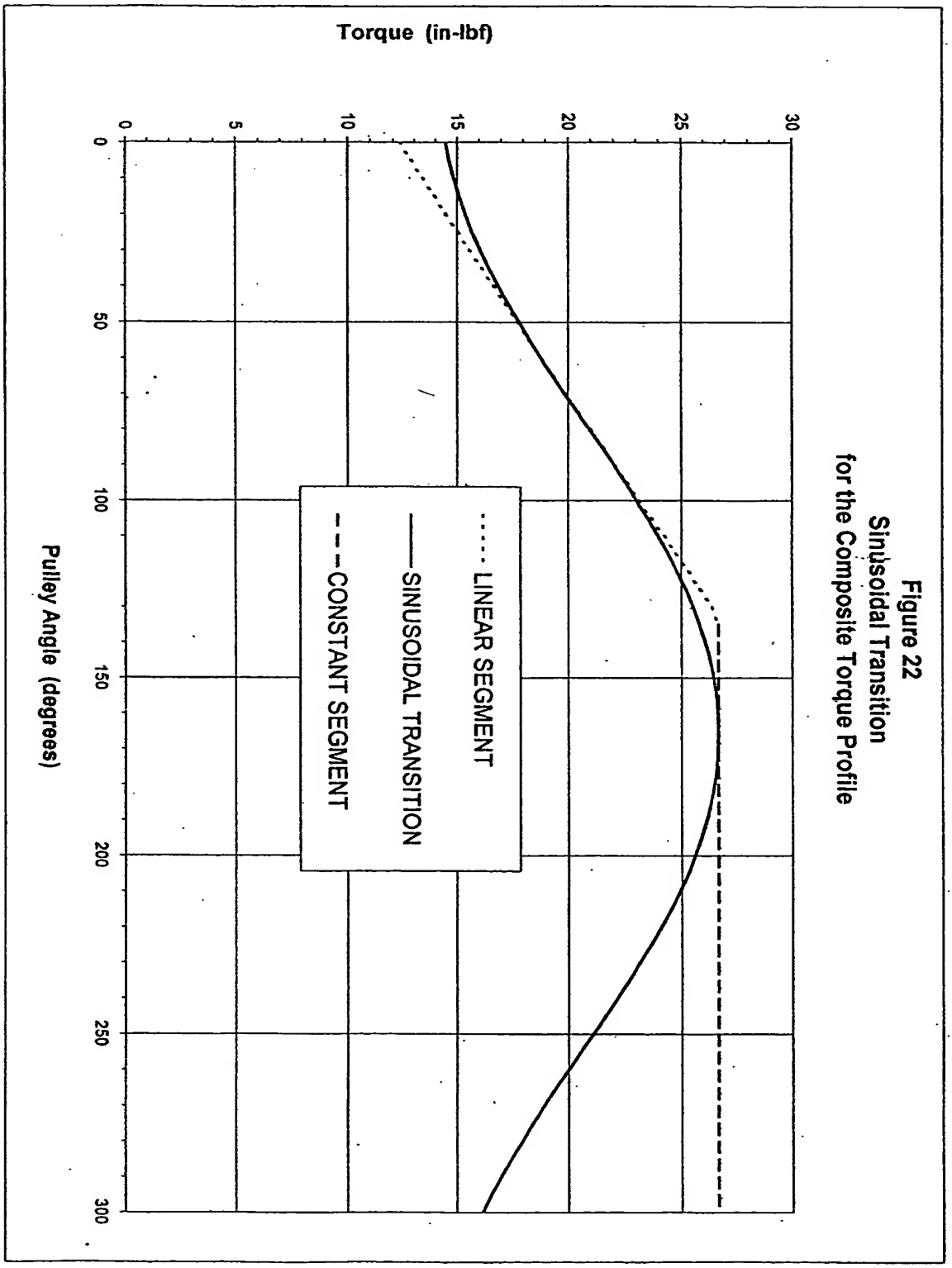


Figure 22
Sinusoidal Transition
for the Composite Torque Profile

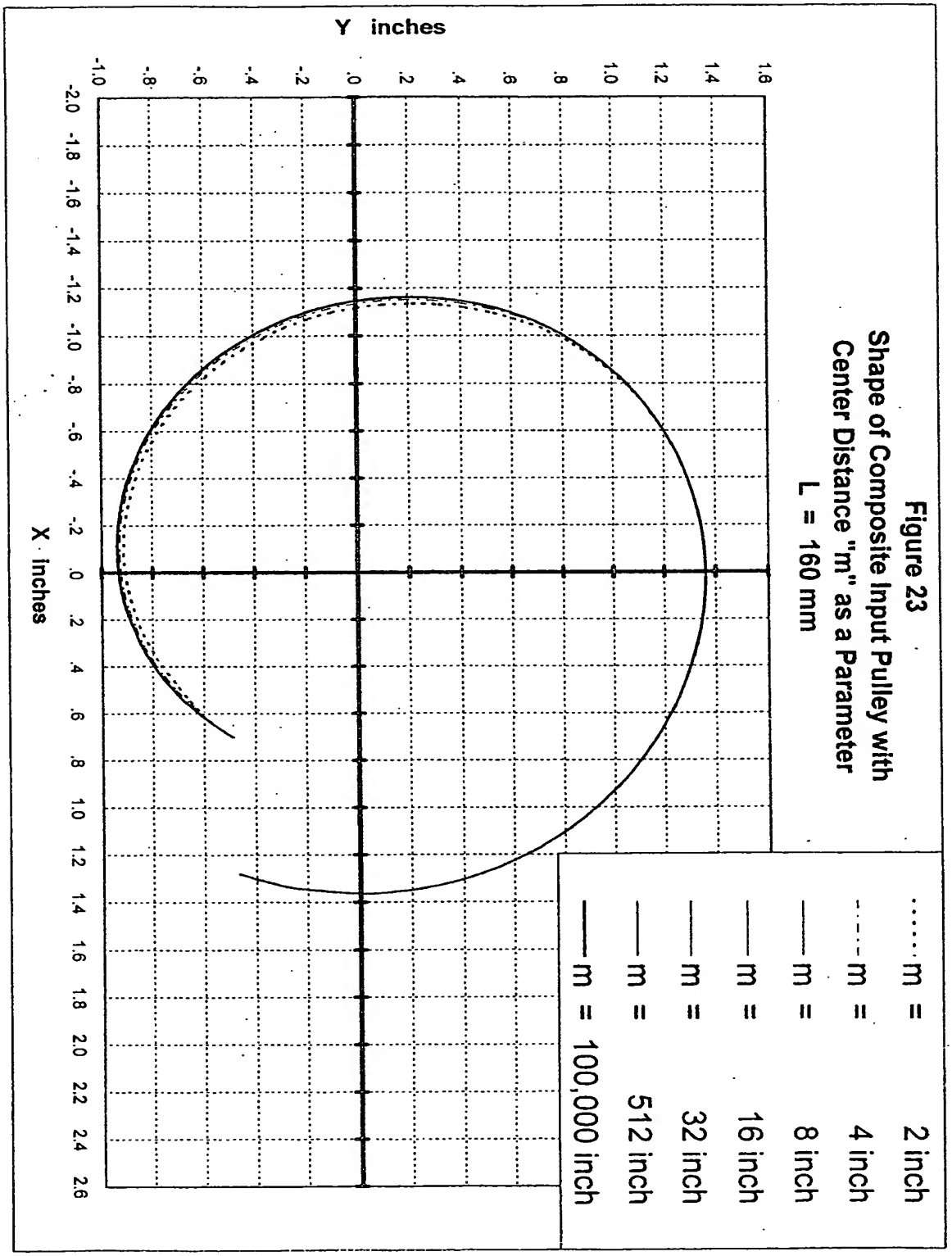
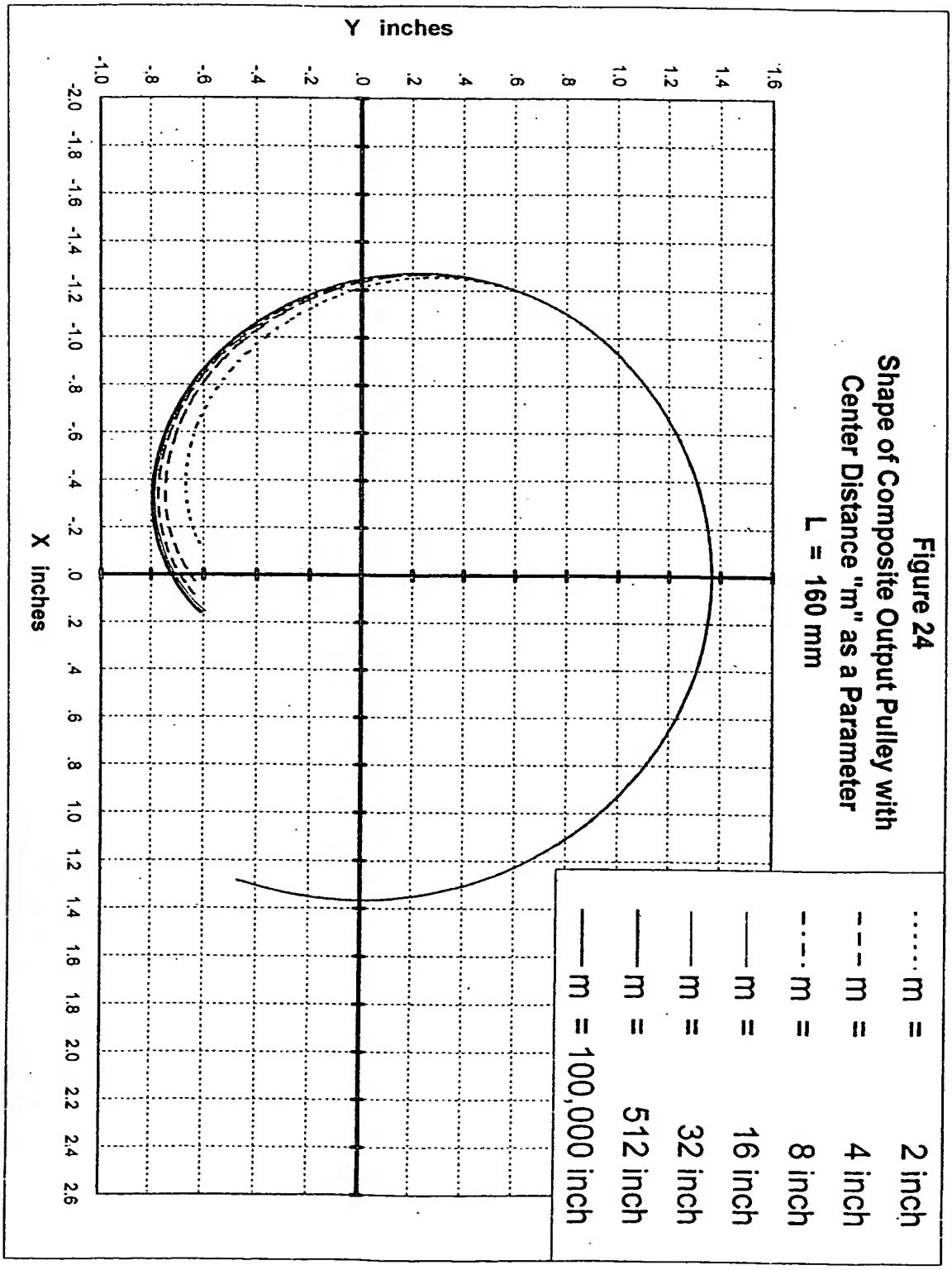


Figure 23
Shape of Composite Input Pulley with Center Distance "m" as a Parameter
L = 160 mm


Y inches
X inches
-1.0 -.8 -.6 -.4 -.2 .0 .2 .4 .6 .8 1.0 1.2 1.4 1.6
-2.0 -1.8 -1.6 -1.4 -1.2 -1.0 -.8 -.6 -.4 -.2 .0 .2 .4 .6 .8 1.0 1.2 1.4 1.8 1.8 2.0 2.2 2.4 2.6
Figure 24
Shape of Composite Output Pulley with
Center Distance "m" as a Parameter
L = 160 mm
..... m = 2 inch
- - - m = 4 inch
- - - . m = 8 inch
—— m = 16 inch
—— m = 32 inch
—— m = 512 inch
—— m = 100,000 inch